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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/677,558	09/29/2000	Gi-Young Jeun	29347/990488	1618

7590 05/04/2004

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EXAMINER	
NGUYEN, DILINH P	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 05/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/677,558	JEUN ET AL.	
	Examiner	Art Unit	
	DiLinh Nguyen	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 8-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 8-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-2, 4 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mehr (U.S. Pat. 5530295) (previously applied) in view of Ohno et al. (U.S. Pat. 5227662) (previously applied).

Mehr discloses a semiconductor package (fig. 1, column 2, lines 30 et seq.) comprising:

a lead frame 18 having a first portion at a first level, a second portion connected to the first portion at a second level, and a plurality of terminals connected to the second portion;

a power circuit 12 mounted on a first surface of the first portion;

a heat sink 22, wherein the heat sink directly contacts a second surface opposite the first surface of the first portion of the lead frame; and

a sealer 16 having an electrically insulating property and thermal conductivity, wherein the sealer covers the power circuit.

Mehr does not disclose the heat sink having an electrically insulating property and thermal conductivity.

However, Ohno et al. disclose that SiC and AlN can be selected as the material of a heat sink 40, the heat sink having an electrically insulating property and thermal conductivity (cover fig., column 5, lines 44-45). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select SiC and AlN for the heat sink of Mehr with the material having an electrically insulating property and thermal conductivity as set forth above because as taught by Ohno et al., such the electrically insulating heat sink would provide an excellent heat conductor and low cost for the semiconductor package (see col. 5, lines 42-47).

- Regarding claim 2, Mehr discloses that the first portion of the lead frame is centrally positioned within the lead frame (see fig. 1).
- Regarding claim 4, Mehr discloses that the first surface of the first portion is a top surface and wherein the second surface of the first portion is a bottom surface (see fig. 1).
- Regarding claim 10, Mehr discloses that the heat sink and the sealer each have grooves and wherein the heat sink and the sealer are connected to each other by means of the grooves (fig. 1).
- Regarding claim 11, Ohno et al. discloses that the heat sink 40 is sheet shaped and comprises at least one compound selected from the group consisting of AlN (see fig. 1, column 5, lines 44-45).

3. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mehr (U.S. Pat. 5530295) (previously applied) in view of Ohno et al. (U.S. Pat.

5227662) (previously applied) and further in view of Majumdar et al. (U.S. Pat. 5703399) (previously applied).

- Regarding claims 3 and 5, Mehr and Ohno et al. substantially disclose all the limitations as claimed above except for the package comprising a power semiconductor element and a control circuit that drives the power circuit.

However, Majumdar et al. disclose that a lead frame 3 having a first portion at a first level, a second portion surrounding the first portion at a second level, and a plurality of terminals 15 and17 connected to the second portion;

a power circuit 9 includes a power semiconductor element 4a; and

a control circuit 8 that drives the power circuit (fig. 9, column 7, lines 10-25).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Mehr by having a power semiconductor element and a control circuit that drives the power circuit as set forth above because such the power element and control circuit would enhance the noise resistance and control the operation of the power circuit (column 7, lines 10-12).

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mehr (U.S. Pat. 5530295) (previously applied) in view of Ohno et al. (U.S. Pat. 5227662) (previously applied) and further in view of McCarthy et al. (U.S. Pat. 3956726) (previously applied).

Mehr and Ohno et al. substantially disclose all the limitations as claimed above except the module further comprising a heat detection circuit.

However, McCarthy et al. disclose a device comprising a heat detection circuit (column 1, lines 39-42). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Mehr by having a heat detection circuit as set forth above because such the heat detection circuit would detect the heat produced by the semiconductor element for the package device (column 1, lines 39-42).

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mehr (U.S. Pat. 5530295) (previously applied) and Ohno et al. (U.S. Pat. 5227662) (previously applied) in view of Tomita et al. (U.S. Pat. 5440169) (previously applied).

Mehr and Ohno et al. substantially disclose all the limitations as claimed above except the heat sink is adhered to at least one of the lead frame and the sealer with an adhesive.

However, Tomita et al. disclose a heat sink 30 is adhered to at least one of the lead frame and a sealer 6 with an adhesive of a plurality of dimples 25 (fig. 8, column 5, lines 35-60). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Mehr by having the heat sink is adhered to the lead frame and the sealer with an adhesive as set forth above because such the heat sink is adhered to the lead frame and the sealer with the adhesive would improve the molding characteristics for the semiconductor package (column 5, lines 60 et seq.).

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mehr (U.S. Pat. 5530295) (previously applied) and Ohno et al. (U.S. Pat. 5227662)

(previously applied) in view of Tomita et al. (U.S. Pat. 5440169) (previously applied) and further in view of Majumdar et al. (U.S. Pat. 5703399) (previously applied).

As discussed in details above, the combination of Mehr, Ohno et al. and Tomita et al. substantially disclose all the limitations as claimed above except the adhesive contains a filler that includes at least one compound selected from the group consisting of Al_2O_3, AlN and BeO.

However, Majumdar et al. disclose a highly heat conducting resin 2, wherein the adhesive contains a filler that includes at least one compound selected from the group consisting of AlN (column 8, lines 22-34). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select AlN for the filler in the adhesive of the above combination because as taught by Majumdar et al., such the filler in the adhesive would provide a highly heat conducting resin with an excellent electric insulating property and thermal conductivity (column 8, lines 25-34).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DLN

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